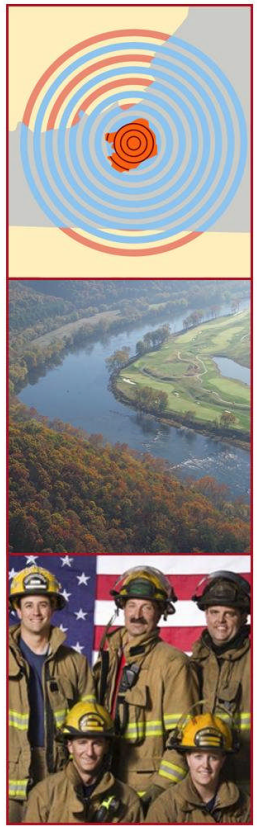


NTIA - PSIC Grant Program

Region 6 Project Idea:

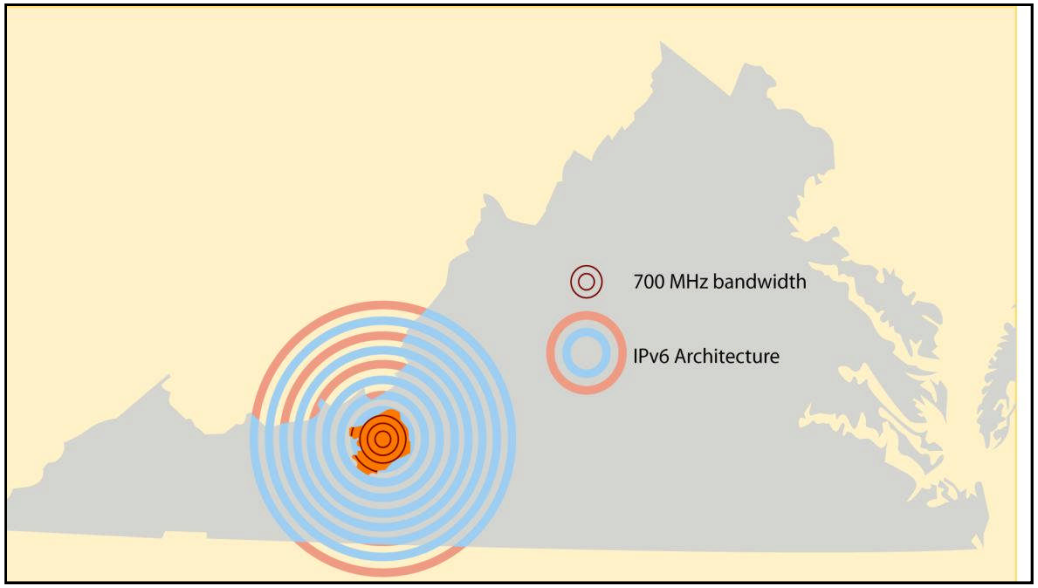
VAWin – Virginia Wireless Information Network

Montgomery County Virginia - Secure Broadband Wireless Pilot Network for Public Safety

Steve Jones - Town of Blacksburg
Tom Afferton - Northrop Grumman
Royce Kincaid - Command Federal

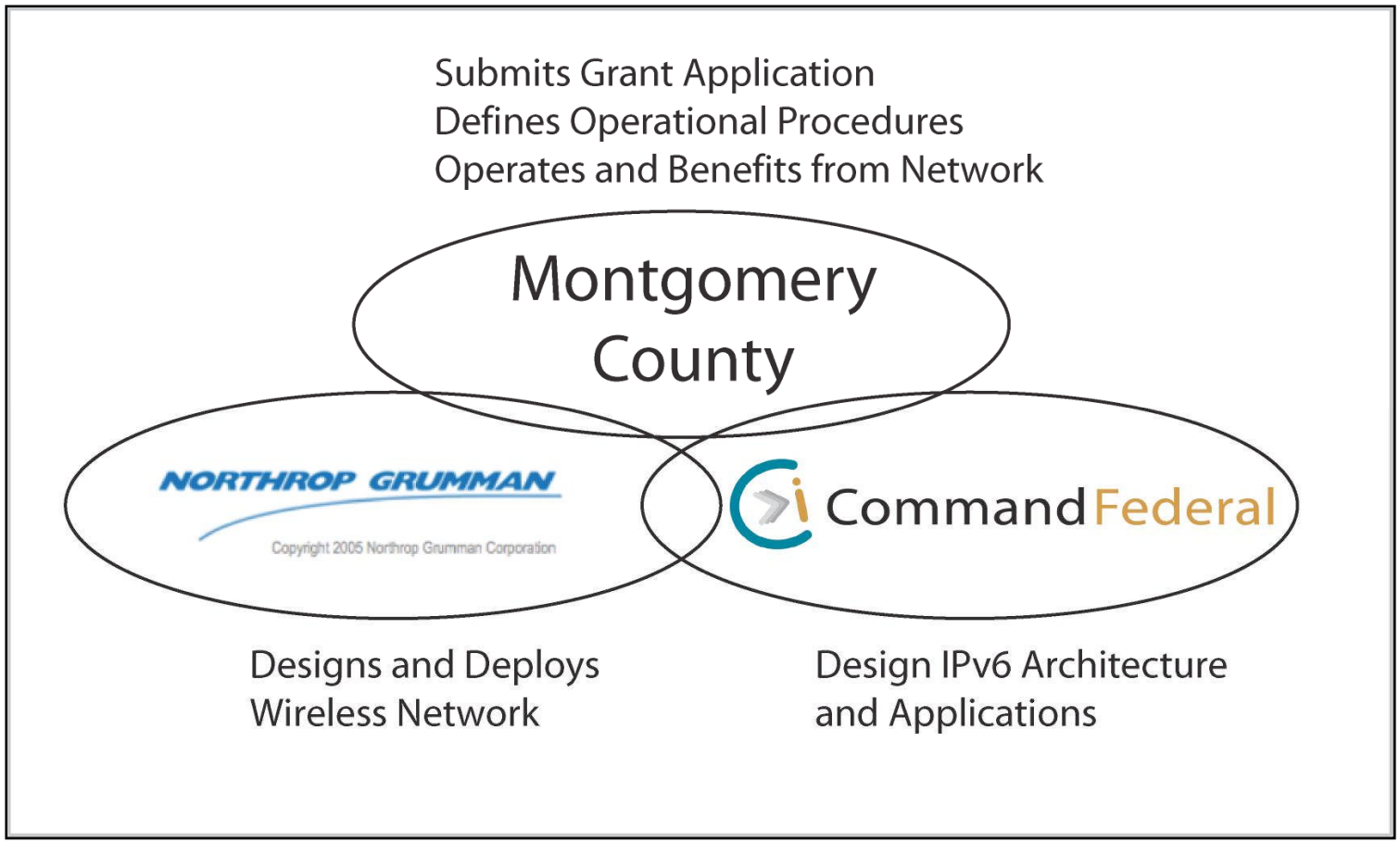
October 10, 2007

Program Objectives



- Improve Public Safety Operations in a Multi-Jurisdictional and Multi-Organizational Environment
  - Blacksburg, Christiansburg, Montgomery County
- Use of 700 MHz for Broadband Technology consistent with FCC goals (10 MHz)
  - Secure Broadband COTS Implementation
  - Integration of IPv6 Architecture & Applications
- Model Program for Future National Implementation

The Players


Submits Grant Application
Defines Operational Procedures
Operates and Benefits from Network
Montgomery County
NORTHROP GRUMMAN
Copyright 2005 Northrop Grumman Corporation
CommandFederal
Designs and Deploys Wireless Network
Design IPv6 Architecture and Applications

Vision for Montgomery County

Significantly enhance public safety operations

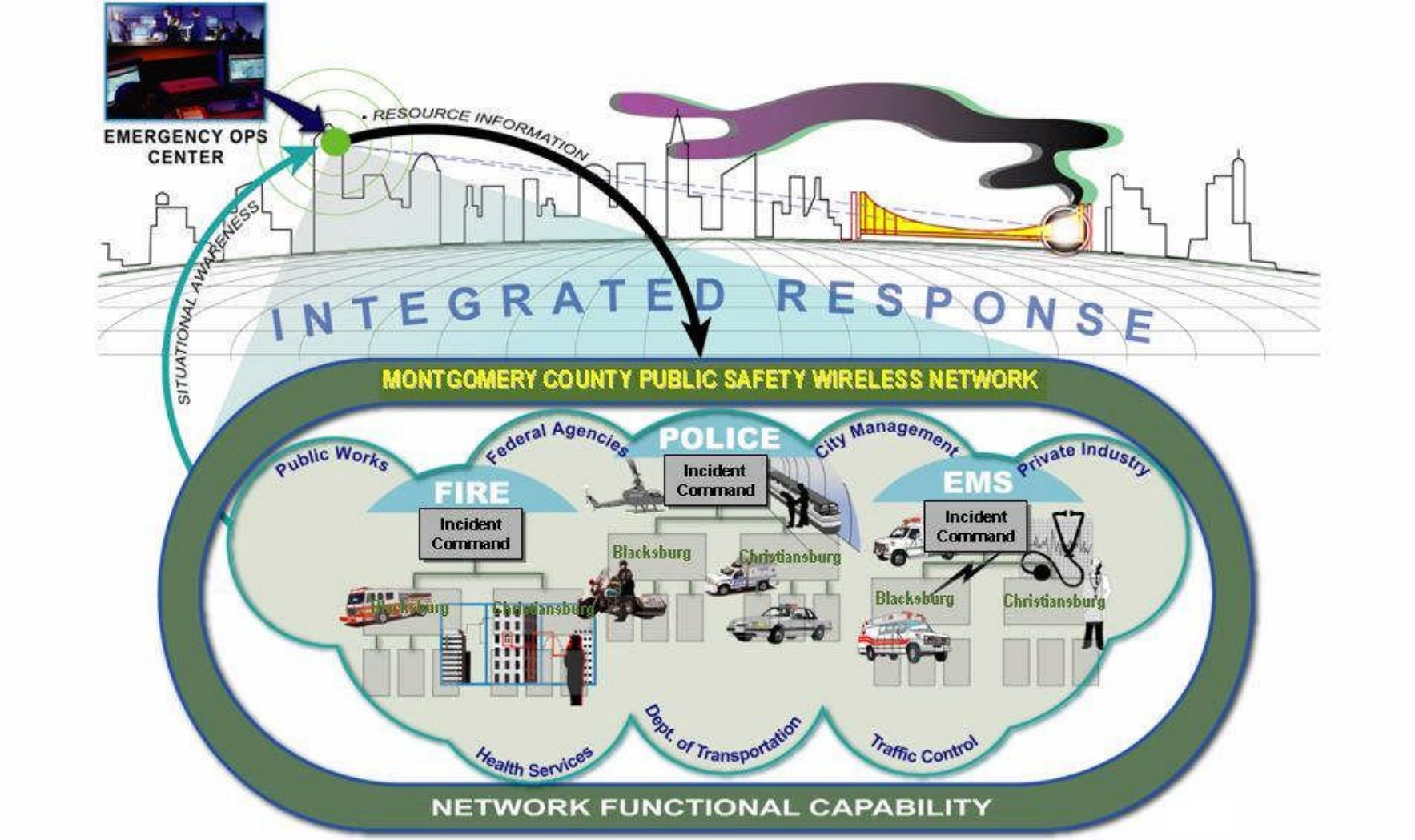
Enhance command and control and situational awareness capabilities

- Streamline and improve normal daily public safety operations
  - Rich information delivery to/from first responders – video, maps, floor plans
- Integrate communications to improve county-wide response to major emergency incidents
  - Improve communication and information sharing *between* agencies and jurisdictions providing mutual aid

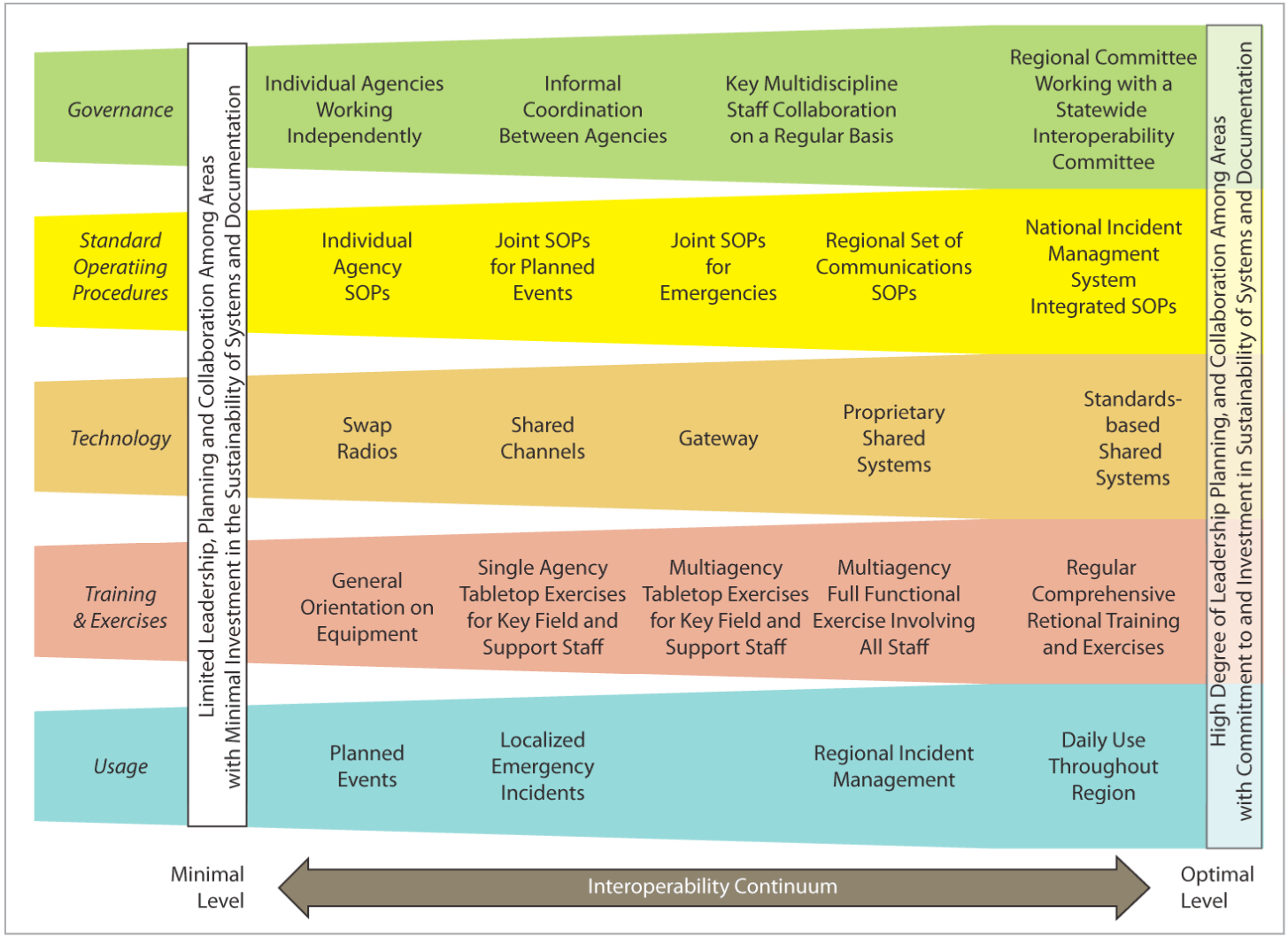
Right Information – Right Person – Right Time

Vision for Montgomery County

Enhanced response to major emergency incidents



SAFECOM Interoperability Continuum



Source: www.safecomprogram.gov

Network Features & Benefits

- 700 MHz Public Safety Broadband Spectrum
  - Early instantiation of future 700 MHz public safety broadband
  - Consistent with future direction of the National Licensee
- Standards Compliance
  - UMTS worldwide wireless standard (COTS)
  - Internet Protocol IP standards
    - IPv6 networking standards
  - Security Standards FIPS 140-2 compliance
- Interoperable
  - Natural Interoperability created through Networking Standards
  - Multi-level secure network with access control and information sharing among multiple organizations
- Next-generation Applications including:
    - Video
    - Location Services
    - Geospatial

Network Compliance - Guidance

NTIA Compliance

- Most advanced technological solution
- Improve spectrum efficiency
- Use cost-effective measures
- Improve communications in areas at high risk for natural disasters
- Continue to improve interoperability efforts in urban and metropolitan areas at high risk for threats of terrorism
- 700 MHz operation (preferably using frequencies 764-776 MHz and or/794-806 MHz)
- Demonstrate a true interoperable capability for end users
- Regional structure: multiple jurisdictions and multiple Public Safety agencies within a given jurisdiction
- Common standards-based shared system
- System can Interoperate with existing legacy (LMR, etc.) communications systems
- Advanced/next-generation/proven technology

Network Compliance – State Guidance

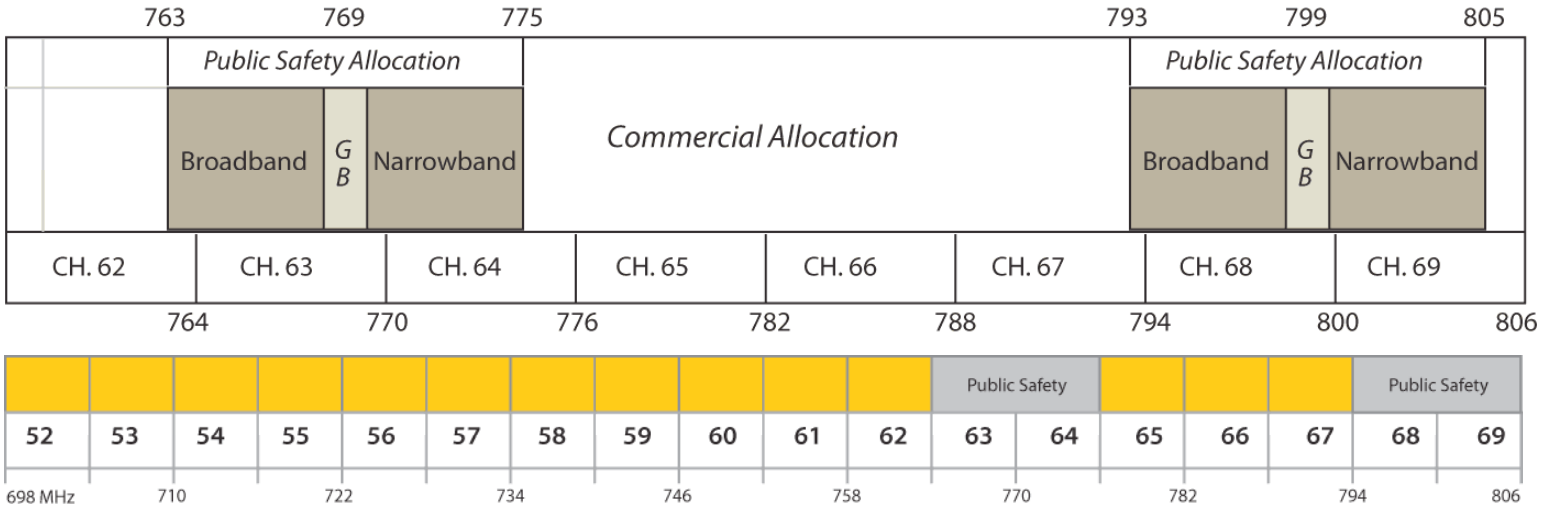
Virginia State Guidance

1. Grant requests must support at least one of the four goals or initiatives presented within this Statewide Plan
2. Applicants must be able to clearly define how the project or equipment purchase improves interoperable communications on a multi-discipline and multi-jurisdictional basis
3. Applicants must be National Incident Management System (NIMS) certified and compliant
4. Agencies and organizations must endorse Virginia's Common Language Best Practice for day-to-day and major emergency situations
5. Equipment purchased with federal grants funds must be on the Department of Homeland Security's Grants and Training (G&T) Authorized Equipment List (AEL) or an exception letter must be on file and approved
6. Subscriber radios purchased must be programmed with mutual aid and interoperability channels within that radio's frequency band

Network Compliance – State Guidance (2)

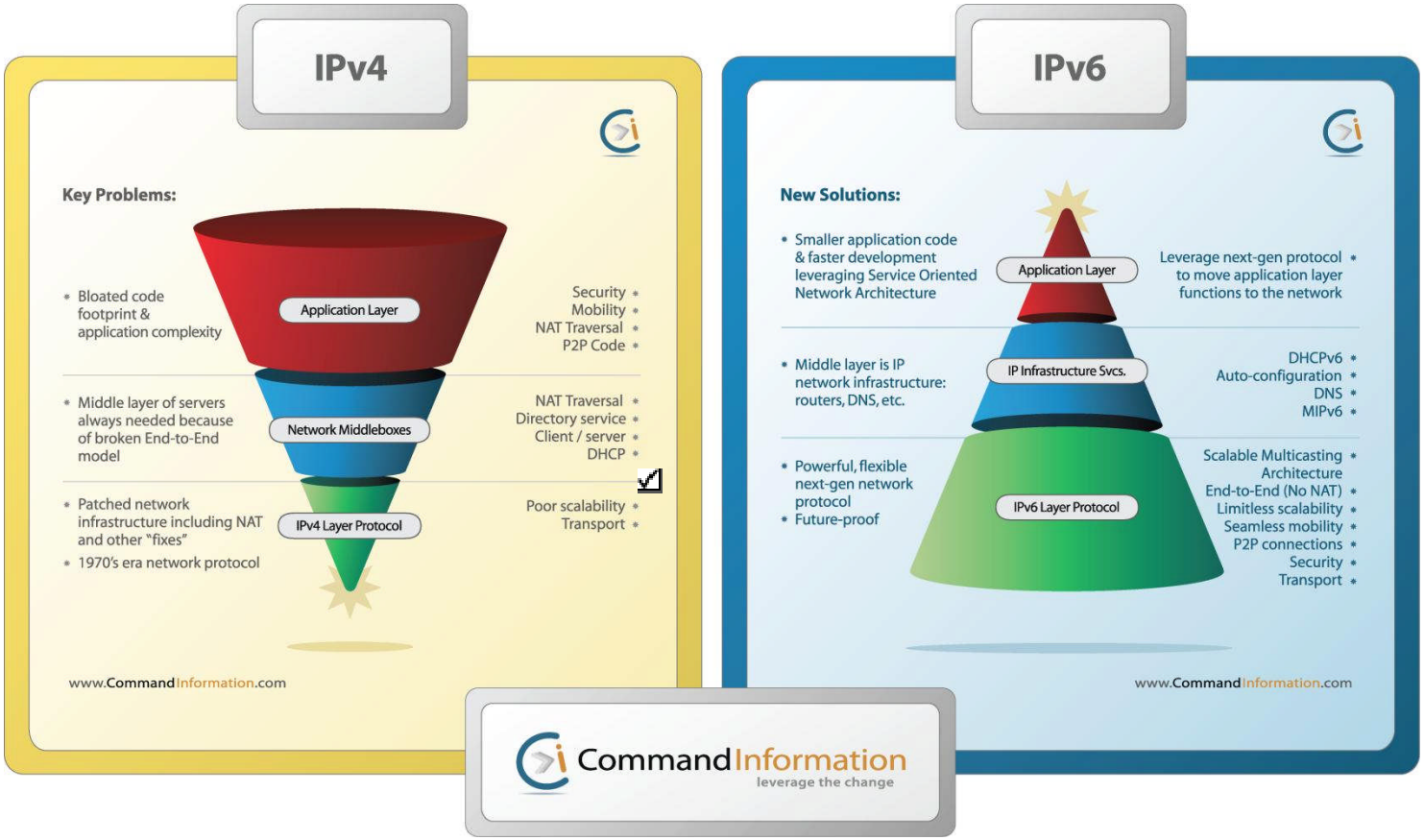
7. Proof of FCC licenses required when appropriate
8. Data sharing equipment purchased with federal grant funds must comply with the Department of Homeland Security's and Emergency Interoperability Consortium's Extensible Markup Language
9. When procuring equipment for communication system development and expansion, a standards-based approach should be used to begin migration to multi-jurisdictional and multi-disciplinary interoperability. Specifically, all new voice systems should be compatible with the ANSI/TIA/EIAA-102 Phase 1 (project 25 or P25) standards
10. Applications of federal funds allocated for improving public safety communications and interoperability shall be public safety agencies or organizations at the local, tribal, regional, or state level unless otherwise specified
11. Applicants must be compliant with all other federal grant guidance as provided and appropriate.

Spectrum



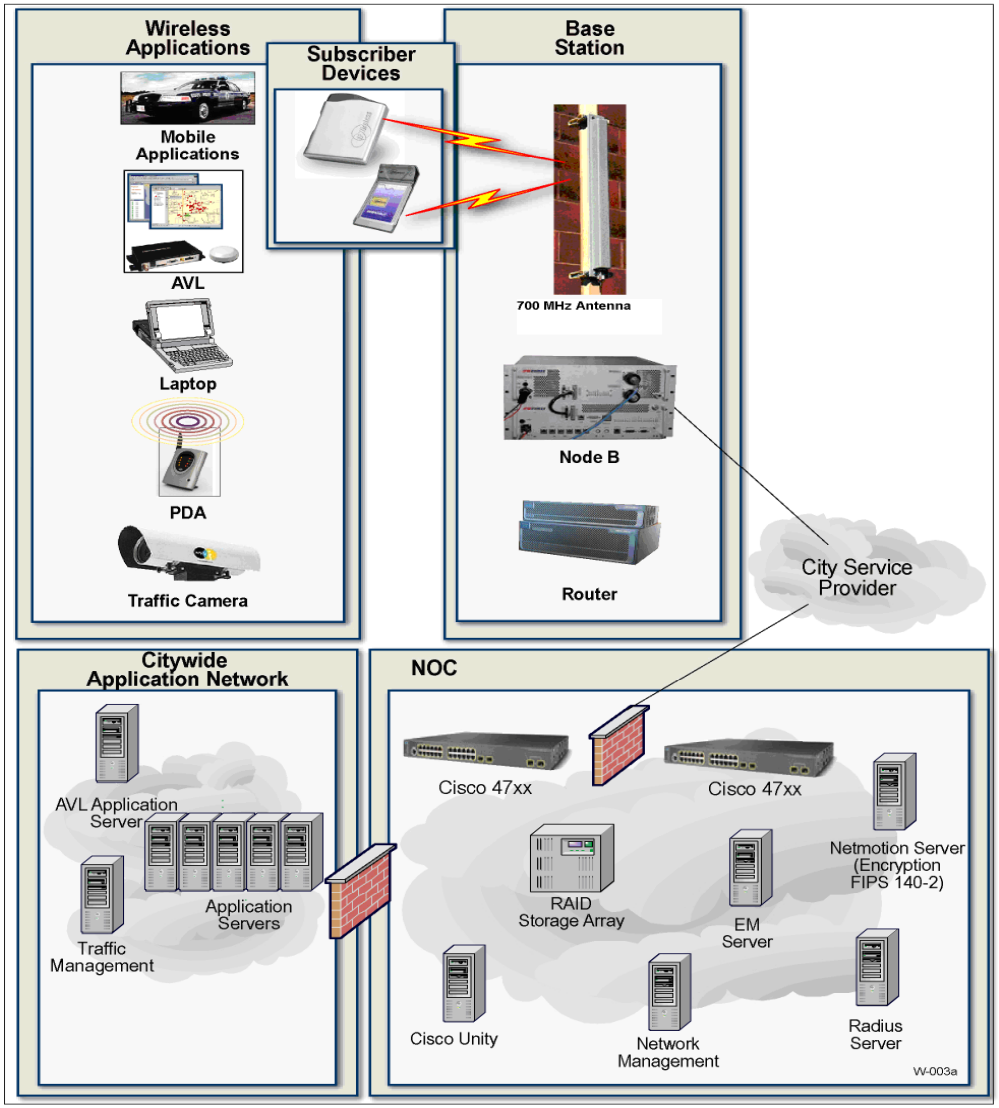
- System will operate on TV channels 64 and 69 prior to DTV transition deadline (2/17/09)
- Will transition to the public safety broadband spectrum (763-768 and 793-798 MHz) after DTV transition
- System can interoperate with and become part of the future nationwide interoperable broadband public safety wireless network per recently-adopted FCC rules

IPv6 – Converged Network Solution



- Added Network Efficiency
- Converged Networking allowing for present & future networking flexibility
- Supports extended 128 bit addressing
- Security & Mobility Features

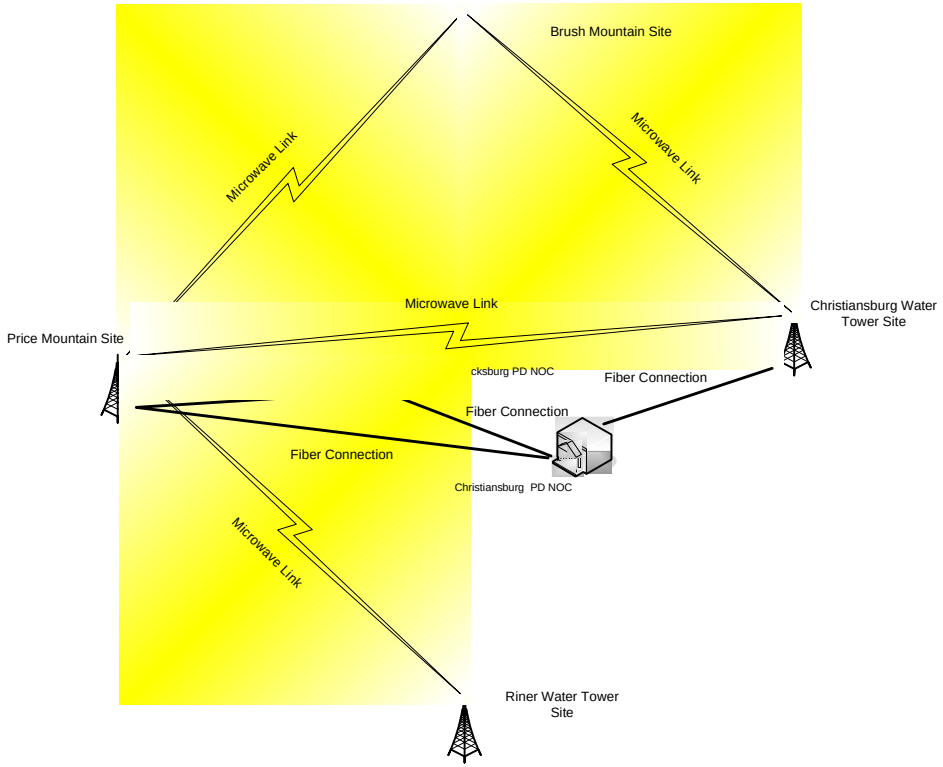
Network Architecture



- 700 MHz Operation
- 4G COTS Equipment
- IPv6 Integration
- Integrated NOC
- UMTS Standard
- Video Support
- Automatic Location
- Broadband Operation

Network Configuration

- **Coverage**
  - 4 Base Stations
  - Existing Sites
  - Highly Populated Locations
  - Contiguous Coverage - Expandable
- **Technology**
  - Secure Broadband Wireless IP Network
  - Multiple Applications
  - Flexible Bandwidth supporting Video, Geospatial, and other critical applications
- **Backhaul**
  - Microwave Links, Fiber
  - Redundant

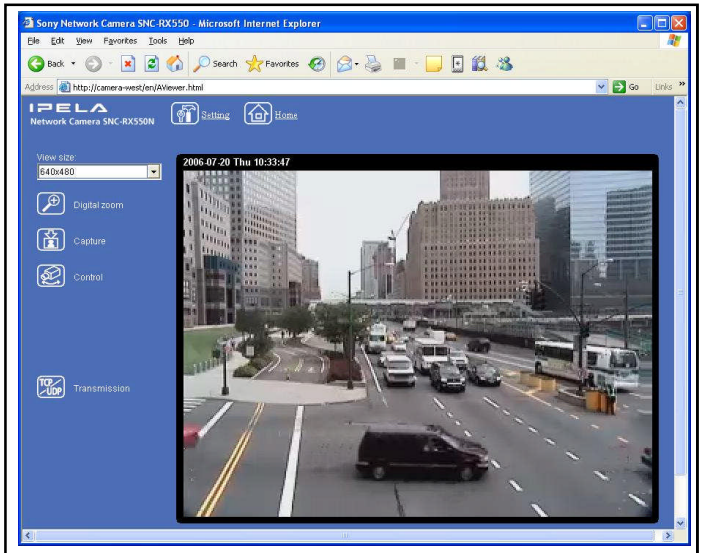


Network Features

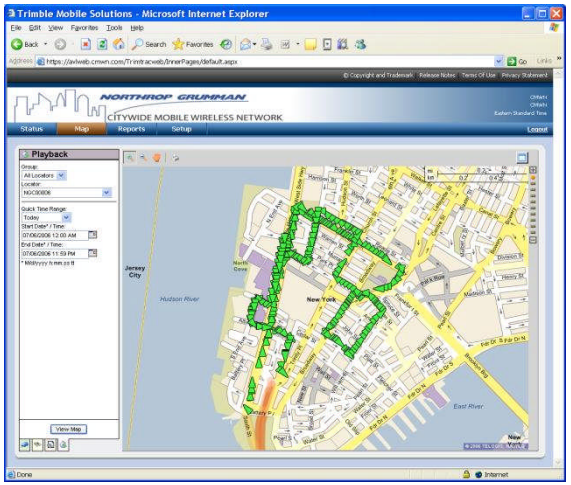
- COTS IP networking equipment
- Network scalability and flexibility for future network expansion to cover the whole county (and eventually the entire Commonwealth)
- Standards-based wireless system technology, FDD TD-CDMA commercially deployed around the world
- Excellent mobile performance in a single pair of 5 MHz channels with up to 21 Mbps per site of downlink capacity and 13.8 Mbps of uplink capacity
- Standards-based control applications
- Managed, on-demand interoperability
- Standards-based encryption
- Enhanced reliability through network control redundancy
- Implementation and maintenance costs similar to standard IT networks
- Reduced obsolescence

Secure Broadband Applications

Streaming Video / Live TV



Wireless CCTV



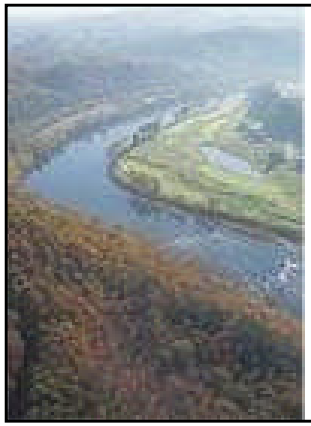
Location Services

PDA Apps

Secure Broadband Applications

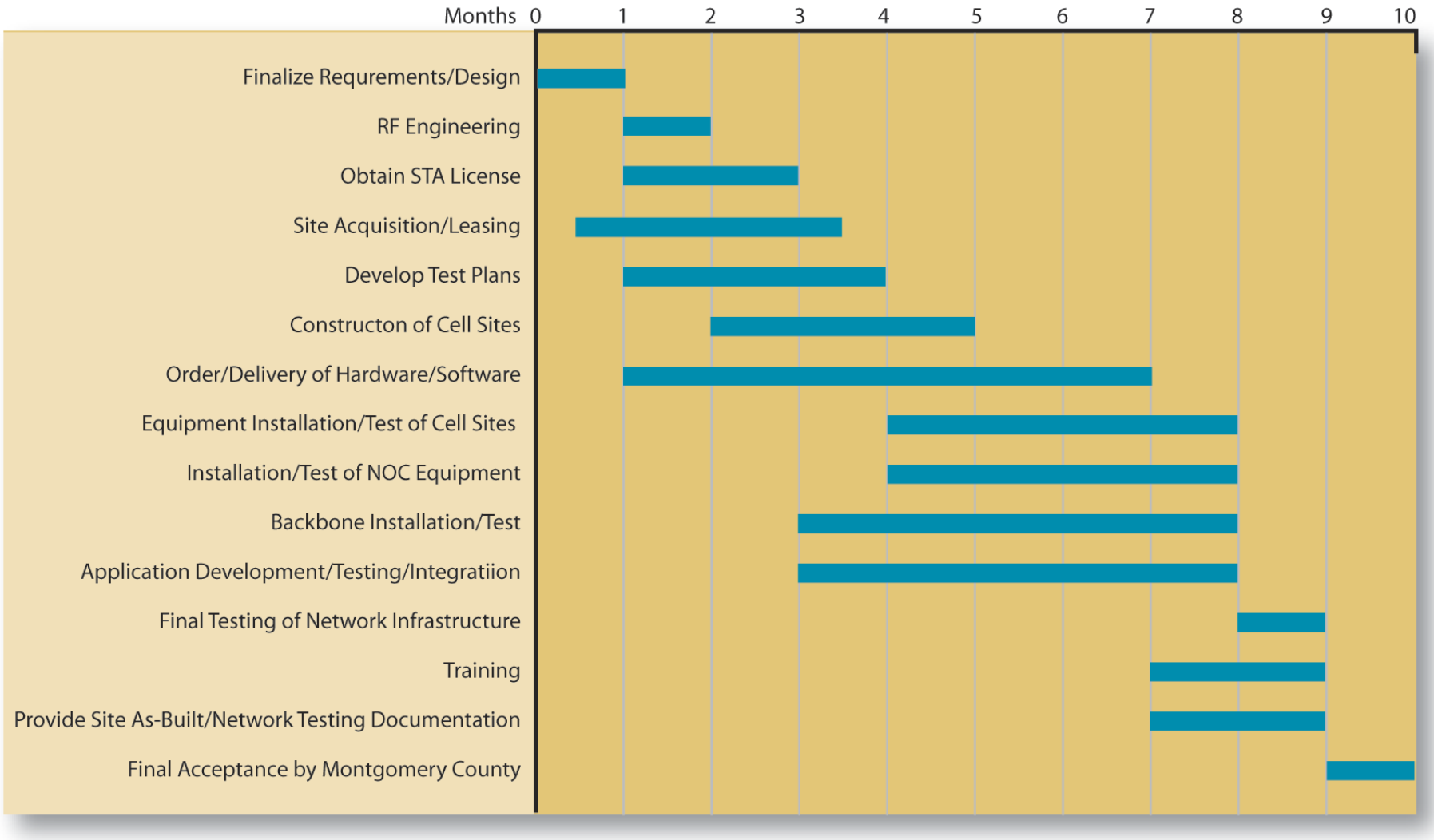
AVL Asset Tracking

Telemedicine



Water Toxicity/ Flood Control

Project Schedule



Estimated Costs Summary

Site Construction/Backhaul	$ 1,400,000
Equipment	1,400,000
Labor	2,520,000
Applications	880,000
Network Operations Centers (2)	750,000
Training/2009/2010 Exercises	300,000
Operations and Maintenance	800,000
Total Funding Requested	$ 8,050,000*

*25% reduction to $6,037,500

Conclusion

- This solution needed for enhanced interoperability in the region – strong buy-in from local public safety stakeholders
- Implements technology that will be used for years to come – in a nine-month time frame
- Project is compliant with NTIA and Commonwealth of Virginia Interoperability Office grant criteria
- 60x-70x faster than existing communications systems
- Standards-based technology resulting in significant cost savings
- A sustainable solution for the long-term
- Benefits to all of the citizens of Montgomery County!!

Backup Slides

Interoperability Vision and Mission

2015 Vision

By 2015, agencies and their representatives at the local, regional, state, and federal levels will be able to communicate using compatible systems, in real time, across disciplines and jurisdictions, to respond more effectively during day-to-day operations and major emergency situations.

Mission

Improve public safety communications in the Commonwealth of Virginia through enhanced voice and data communications interoperability. To achieve the 2015 vision, the State Interoperability Executive Committee (SIEC) developed the following goals to enhance data and voice communications interoperability:

GOAL 1: Create a common understanding of communications interoperability throughout the Commonwealth

GOAL 2: As appropriate, utilize common language, coordinated protocols and standards statewide

GOAL 3: Integrate existing and future communications systems

GOAL 4: Facilitate training to enhance effective use of communications systems.

Features and Benefits (1 of 2)

	Features	Benefits
Interoperability	**All end users share the same bandwidth in this broadband wireless network using the Internet Protocol as the common denominator. All users within the region use common devices.**	**More effective operational and emergency response due to enhanced communications interoperability among police/fire/EMS personnel within and across jurisdictions using the same bandwidth and IP technology.**
Spectrum	**This project operates in the spectrum that will be available for public safety use beginning in February 2009; very spectrally efficient with excellent propagation characteristics.**	**Efficient broadband spectrum allows users to all share the same bandwidth; only two (2) 6 MHz channels will provide sufficient bandwidth; this spectrum footprint most likely to be used by public safety for decades.**
IPv6 Architecture	**Network architecture is based on the next-generation Internet Protocol which is mandated for federal government implementation by June 2008; reduces network complexity; increases efficiency; puts the "power" of the network at the edge of the network with the end user.**	**Moves processing to the edge of the network to empower the end-user community; provides device auto-configuration for quick interoperable capability; provides more secure peer-to-peer communications.**

Features and Benefits (2 of 2)

	Features	Benefits
Compliance	**The network and implementation approach are fully compliant with grant eligibility criteria set forth by SAFECOM, NTIA (PSIC), and the Commonwealth of Virginia's Strategic Plan for Statewide Communications Interoperability.**	**Increases the probability of successful implementation, institutionalization and expansion over the long term.**
COTS Standards	**The network is built using all commercially-available products based on open architecture and open systems standards.**	**Significantly reduces the cost of network implementation on a large geographic scale; eliminates dependency on proprietary technology.**
Scalability	**Pilot program can be easily expanded outside of this geographic area and can also interface with other existing legacy wireless networks.**	**Successful project could serve as a statewide platform/lb for interoperability projects well beyond the original scope of this pilot project.**
Applications	**System will support all of the traditional public safety applications and will demonstrate innovations enabled by IPv6 features and capabilities.**	**Enhance end user confidence for operational mission support; buy-in for new applications that truly improve emergency response effectiveness.**

State and Local Compliance (1 of 2)

Criteria	Status Summary
1. Grant requests must support at least one of the four goals or initiatives presented within this Statewide Plan	**Our proposal meets all four of the Commonwealth's goals that are in the Statewide Plan**
2. Applicants must be able to clearly define how the project or equipment purchase improves interoperable communications on a multi-discipline and multi-jurisdictional basis.	**All end users that are on this network have intra-jurisdictional and inter-jurisdictional interoperability because all users use IP devices.**
3. Applicants must be National Incident management System (NIMS) certified and compliant.	**The Montgomery County Public Safety Wireless Consortium meets the NIMS requirements.**
4. Agencies and organizations must endorse Virginia's Common Language Best Practice for day-to-day and major emergency situations	**All agencies and organizations endorse Virginia's Common Language Best Practice for day-to-day and major emergency situations.**
5. Equipment purchased with federal grants funds must be on the Department of Homeland Security's Grants and Training (G&T) Authorized Equipment List (AEL) or an exception letter must be on file and approved.	**The equipment being used for this network has been approved by the Department of Homeland Security.**
6. Subscriber radios purchased must be programmed with mutual aid and interoperability channels within that radio's frequency band.	**The radios access nodes and end user devices are interoperable by definition.**

State and Local Compliance (2 of 2)

Criteria	Status Summary
7. Proof of FCC licenses required when appropriate.	**An STA will be requested from the FCC to operate this network; preliminary spectrum testing showed that channels 64 and 69 are available to be used for this network.**
8. Data sharing equipment purchased with federal grant funds must comply with the Department of Homeland Security's and Emergency Interoperability Consortium's Extensible Markup Language.	**Any shared system provided will use the Extensible Markup Language requirements established by DHS' Security and Emergency Interoperability Consortium.**
9. When procuring equipment for communication system development and expansion, a standards-based approach should be used to begin migration to multi-jurisdictional and multi-disciplinary interoperability. Specifically, all new voice systems should be compatible with the ANSI/TIA/EIAA-102 Phase 1 (project 25 or P25) standards.	**N/A; we are not procuring any P25 equipment as part of this grant request.**
10. Applications of federal funds allocated for improving public safety communications and interoperability shall be public safety agencies or organizations at the local, tribal, regional, or state level unless otherwise specified.	**The Montgomery County Public Safety Wireless Consortium consists of local jurisdictions and the local county; the network will be used by local public safety (i.e., police, fire, EMS)**
11. Applicants must be compliant with all other federal grant guidance as provided and appropriate.	**PSIC**

NTIA Compliance (1 of 2)

Criteria	Status Summary
Most Advanced Technological Solution	**IP Wireless' 700 MHz hardware combined with an IPv6 network architecture is a totally next-generation broadband wireless solution**
Improve Spectrum Efficiency	**IPWireless 5 MHz broadband technology within a 6 MHz channel is optimal efficiency for use of this spectrum**
Use Cost-effective Measures	**All hardware and software used on this pilot network is COTS and standards-based which results in optimal cost-effectiveness**
Improves Communications in Areas at High Risk for Natural Disasters	**This interoperable wireless network can be used for communications in the event of natural disasters**
Continue to Improve Interoperability Efforts in Urban and Metropolitan Areas at High Risk for Threats of Terrorism	**This wireless network topology that combines 700 MHz and an IPv6 network architecture will greatly enhance interoperable communications for any type of public safety emergency.**
700 MHz Operation (preferably using frequencies 764-776 MHz and or/794-806 MHz)	**This network will operate in the following frequencies: 770-776 MHz and 800-806 MHz**

NTIA Compliance (2 of 2)

Criteria	Status Summary
Demonstrates a True Interoperable Capability for End Users	**This is a true interoperable wireless network for all end users; all end users use IP-based devices**
Regional Structure; Multiple Jurisdictions and Multiple Public Safety Agencies Within a Given Jurisdiction	**The Montgomery County Public Safety Wireless Consortium consists of the Town of Blacksburg; the Town of Christiansburg; and Montgomery County**
Common Standards-based Shared System	**All hardware and software used for this pilot wireless network is standards-based**
System Can Interoperate with Existing Legacy (LMR, etc.) Communications Systems	**This pilot wireless network can interface and interoperate with all existing legacy communications systems**
Advanced/Next-generation/Proven Technology	**IPWireless' 700 MHz equipment is next-generation, leading edge technology; an IPv6 network architecture is "next-generation" Internet**